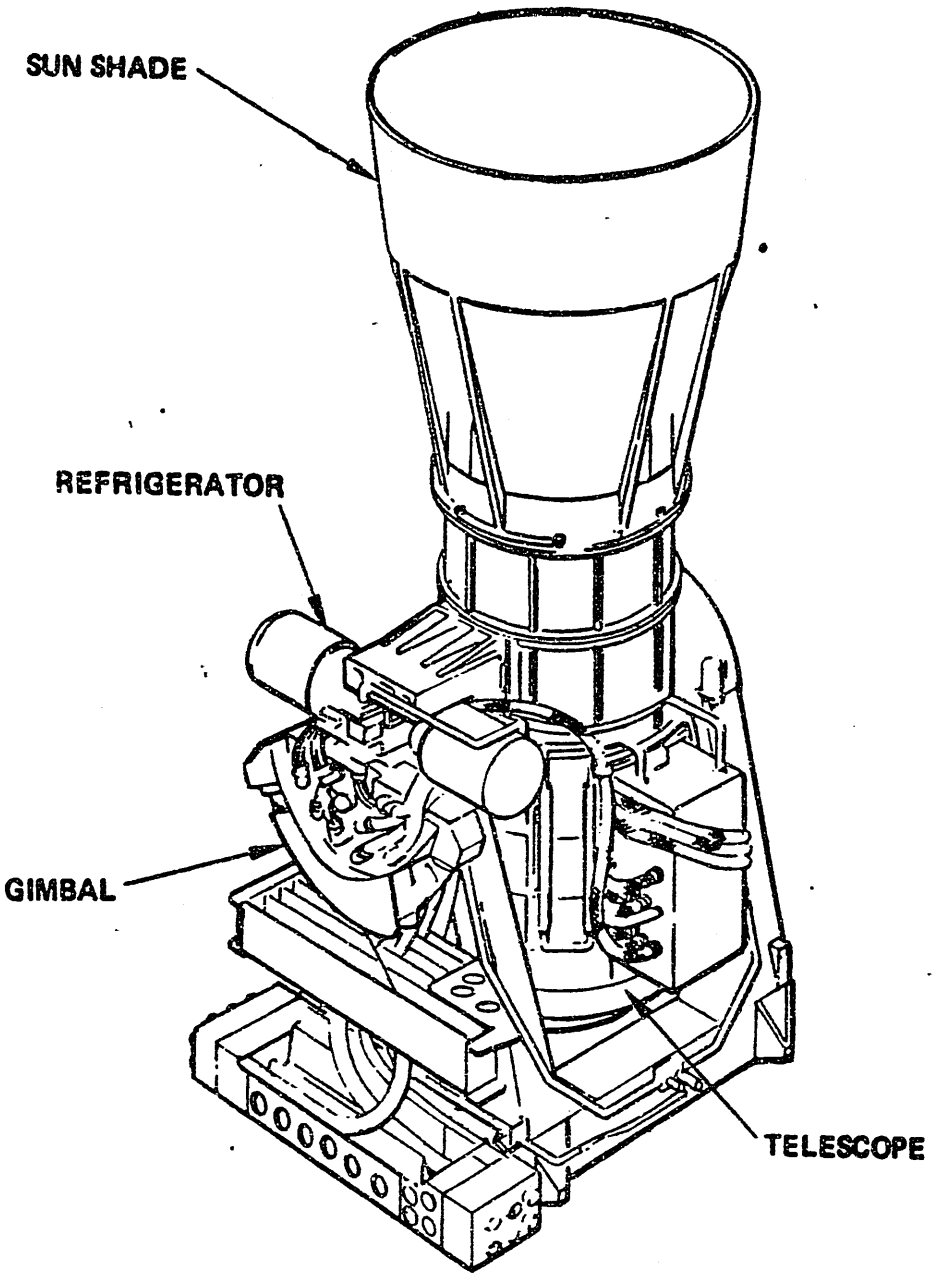
radiation emanating from the background. The data was being obtained by launching radiometers into space on board rocket probes. Three types of missions were being flown--earth-limb, zodiacal, and celestial. Earth-limb flights measured radiation from the earth's upper atmosphere, zodiacal flights measured radiation from interplanetary dust, and celestial flights measured radiation from such sources as asteroids and stars. (27)

Three flights had already occurred by the beginning of FY 1981, and six more were planned. The first of these, an earth-limb flight, occurred on 3 February 1981. Unfortunately, the payload failed to separate from the booster, and the probe broke up during reentry; as a result, the payload was lost and no data was obtained. The separation system used in the probe was modified to make sure that the same thing would not happen again, and the next launch was conducted on 31 July. This flight--a zodiacal flight--was successful; the payload was recovered, and good data was obtained. As the fiscal year ended, preparations were under way for two celestial flights scheduled for January and April 1982. In addition, a zodiacal sensor was being converted to an earth-limb configuration to replace the earth-limb sensor lost on 3 February. (28)

Space Infrared Experiment. The Space Infrared Experiment (SIRE) was to be conducted by placing an LWIR sensor into orbit and using the sensor to detect and track targets and take target

[redacted]



SIRE SENSOR

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and background measurements. The demonstration would test t feasibility of using LWIR sensors for detecting and tracking space objects from satellite platforms, and it would provide that would be needed in designing an operational space-based veillance system. In addition, the measurements would support the development of the antisatellite system described in the first section of this chapter. (29)

● Originally, SIRE was to have gone into orbit on board a free-flying spacecraft. During FY 1979, however, the Air Force had decided that the spacecraft would be too expensive and that SIRE should be flown as a captive payload on board the space shuttle. Two seven-day missions were planned, originally scheduled for FY 1983 and FY 1984. These missions would be supported by a Data Operations System that would generate commands to control the sensor in orbit and would evaluate and reduce the data that the sensor provided. (30)

● The contractor for SIRE was the Hughes Aircraft Company. Hughes was to build and test the sensor, develop and test the Data Operations System, and perform system integration. In October 1980, Space Division ordered Hughes to stop work on the data processing and systems integration tasks for 90 days. This stop work order was issued so that funds could be diverted from SIRE and transferred to the financially hard-pressed antisatellite program. The order was later extended to September

[redacted]

1981, and as a result, Hughes did nothing on data operations or systems integration during this period and devoted all its energy to building and testing the sensor and modifying it for flight on the shuttle. (31)

● Early in the fiscal year, Hughes finished integrating the sensor and putting it through acceptance testing. The sensor was then shipped to the Arnold Engineering Development Center where it underwent calibration testing during January and February 1981. The calibration testing measured sensitivity, focus, crosstalk, and the uniformity of detector responsivity. Meanwhile, Hughes was designing the modifications that would have to be incorporated into the sensor to enable it to fly as a captive payload on board the shuttle.* A preliminary design review on these modifications was held in January 1981 and a critical design review was completed in August 1981. Fabrication of the modifications was already under way by that time, and the modifications were scheduled for completion in FY 1982. (32)

● In order to fly SIRE as a captive payload on the space shuttle, it was necessary to provide some kind of pallet system to interface between the sensor and the orbiter. The original candidate for this role was the Sortie Support System (SSS) being developed by the Space Test Program. However, acquisition of the SSS had been delayed during FY 1980, and it had become clear that

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*These modifications included 1) redesigning the sun shade and the earth shield used to screen out infrared radiation from the sun and the earth, 2) adding a resealable vacuum cover and designing a helium purge to protect the sensor from contamination generated by the shuttle, 3) the addition of a power converter to provide the 105 volts of power needed by the sensor's cryogenic cooler, and 4) various changes to the sensor's electronic boxes. (Hist of Space Division (S/REVW 1 Dec 08), FY 1980, p. 294.)

it would not be ready in time to support the two SIRE missio[illegible] the dates originally scheduled--the second quarter of FY 1983 [illegible] the fourth quarter of FY 1984. Funding cuts during FY 1981 caused development of the SSS to be delayed even more and even[illegible] tually cancelled. A plan was then conceived to use a pallet developed by the European Space Agency and to combine it with avionics borrowed from NASA. There would be just one flight, which would occur in the first quarter of FY 1984. (33)

Although the plan described above solved the original problem of the pallet, new factors had arisen which raised questions about the future of SIRE. For one thing, the cost of completing the SIRE program was significant, and for another, the need for SIRE data seemed to have diminished. That data had been intended to support both the development of the anti-satellite system and the development of a space-based space surveillance system. A SIRE flight in the first quarter of FY 1984 would be rather late to be of significant benefit to the anti-satellite system, and the need for near-term development of a space-based space surveillance system was being called into question, as we will see later in this chapter. On the other hand, to the extent that SIRE data was still needed, one seven-day captive flight aboard the shuttle was not going to satisfy that need to the fullest extent. These factors suggested that it might be wise to abandon the plan for a captive flight aboard the shuttle and either cancel SIRE altogether, using its funds to

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solve the financial problems of the anti-satellite program, or return to the original plan of putting SIRE into orbit on board a free-flying satellite. A ten-month mission on a free-flying satellite would obviously provide much more data than a seven-day mission on board the shuttle and would be much more valuable as a proof-of-concept demonstration for the space-based surveillance system. (34)

In response to these issues, Space Division went to Washington and presented a briefing on SIRE the week of 6 April. The briefing presented four options for the future of the program: 1) cancel the program and put the sensor in storage, 2) fly the sensor in the first quarter of FY 1984 as a captive payload on the shuttle, 3) fly the sensor in FY 1985 or FY 1986 on a free-flying satellite, and 4) complete the sensor but delay the flight decision for one year. Space Division recommended that the first option be adopted if the money from the SIRE program could be diverted to other programs within Space Defense and that the second option be adopted if the funds could not be used in this way. HQ AFSC, however, preferred the fourth option --postponing the decision. HQ USAF accepted this recommendation and issued a Program Management Directive to implement it. As a result of this decision, Space Division's two contracts with Hughes were downscoped so that the SIRE sensor would be completed but no preparations would be made for flying it. The downscoping was accomplished through change orders issued in September 1981; they were to be definitized in FY 1982. (35)

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